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ABSTRACT

Developed to provide seventh and eighth grade students information about careers in the environment occupational cluster, this booklet may be used to integrate career information with various subject areas. (It is one of several student booklets developed for use in the Ohio Career Orientation Program at grades 7 and 8 to assist students in making tentative career decisions for exploration activities in grades 9 and 10.) Several jobs are listed with brief one- or two-sentence descriptions in each of five career areas in the cluster: (1) life science, (2) physical science, (3) education and technology (health technologists and planners and managers), (4) environmental implementation, and (5) environmental application. A closer look at seven specific careers is provided through brief case studies of one individual working in each job: what he does and how he prepared himself. These jobs are air pollution inspector, waste water analyst, environmental health technician, public health sanitarian, private industry sanitarian, interpretive naturalist, and assistant urban planner. Brief exploration activities are suggested through which students would learn more about each job. A chart is provided with notes on how various school subjects (mathematics, English, science, social science, industrial arts, physical education, music, art, and home economics) are related to the environment cluster careers. A list of qualities needed for environment careers and a list of sources for additional career information (professional associations and specific government bulletins) are included along with a vocabulary list. Illustrated with drawings and photographs. (JT)

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Career Orientation Series

The Environment Cluster

What Is the Environment?
page 3

Who Works in Environmental Careers?
page 7

A Close Look at Seven Environmental Careers
page 16

Your School Subjects of Special Importance
page 46

Why Should You Choose a Career?
page 51

Can You See Yourself in Some of These Jobs?
page 53

Resources
page 59

Vocabulary
page 61

Environmental Careers Checklist
page 64

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NATIONAL INSTITUTE OF EDUCATION

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These symbols represent seven career orientation concepts that are integral parts of the student's personal, educational and vocational development. Suggested student activities relating to the seven developmental concepts appear in the book. The corresponding symbol will identify the specific concept to which each activity most directly relates.

Self

This concept deals with how and what a person thinks of the self — attitudes, perceptions and self-evaluation of interests, aptitudes, achievements and values.

Individual and Environment

This concept is concerned with an understanding of the individual as he or she relates to the environment — the role each person plays in the home, school, community and work.

Education and Training

This concept relates to the learning of skills, ideas and appreciations that the individual needs in order to experience a successful life.

World of Work

This concept relates to work values, the variety and nature of occupations, work families and their interdependency, and methods of studying and classifying occupations.

Economics

This concept emphasizes the person as both a worker earning income and as a consumer dispersing income.

Employability and Work Adjustment

This concept deals with obtaining and holding a job and advancing in a career.

Decision Making

This concept relates to all the others, involving a process that is necessary to all facets of society.

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Today's urbanized technological society has brought an urgency for an abrupt turn-around in thinking about the place of career education in our schools. Our economy's rapidly changing character, with large industry remote from residential areas, surrounded by fences, and protected by security guards, does not permit youngsters to see their parents or others at work. Many children's parents are recipients of public assistance checks, a situation that compounds the problem of teaching job-centered values.

Career education begins in kindergarten and continues through Grade 12. Motivation, orientation, exploration, and actual preparation are essential components of meaningful education. Instructional materials to assist classroom teachers in implementing a well-planned and sequentially organized curriculum are vital in the redesign of education.

We trust these instructional materials will be of significance in serving seventh and eighth grade students in preparing for rewarding opportunities in the world of work.

Martin W. Essex

Martin W. Essex
Superintendent of Public Instruction

What Is the Environment?

Look around you. Notice everything.

What do you see, hear, taste, smell, feel? It is all your **Environment.**

Your **environment** is everything that surrounds you. In fact, *you* are part of your environment. You and the things around you affect each other in many ways. Some of these ways may be helpful and some may be harmful.

People have only recently become concerned about the effects of their behavior on the environment. In past ages, there were so few people that their needs could be satisfied with little noticeable damage to the surroundings. Today, massive populations with their industrial development have such a great effect upon our environment that all people must work together to repair and maintain the **natural resources** left on Earth. Our planet is actually a gigantic spaceship with a large passenger list of plants, animals and people, but with a limited cargo of natural resources to supply them.

What Is This Cluster All About?

"Spaceship Earth" is a super **ecosystem** (ek'o sis' tem). This means that all living and nonliving parts of the environment are dependent on each other. Parts of the ecosystem are *balanced;* for example, the amount of minerals that a forest of trees takes out of the soil balances the amount of minerals dead leaves put back into the soil. Other parts of the ecosystem are out of balance; for example, people take coal and oil out of the ground, but are unable to replace any of the natural fuels.

What is an ecosystem? It is a dependent relationship of living and nonliving things. Each thing in an ecosystem depends on every other thing. A terrarium or an aquarium can be a balanced ecosystem. There is probably one in your school. Find out what is needed to maintain a terrarium or aquarium. Find out what might happen if one or more of the needs are not provided for.

Finding solutions to the problems of our environment is the career goal for people working in this job cluster. It is certainly a worthwhile goal. After all, work is man's way of creating, preserving, changing and rebuilding the environment. The people in this book have chosen to deal directly with the problems of the environment. That is what this book on environmental careers is all about.

Why Do We Need Environmental Careers?

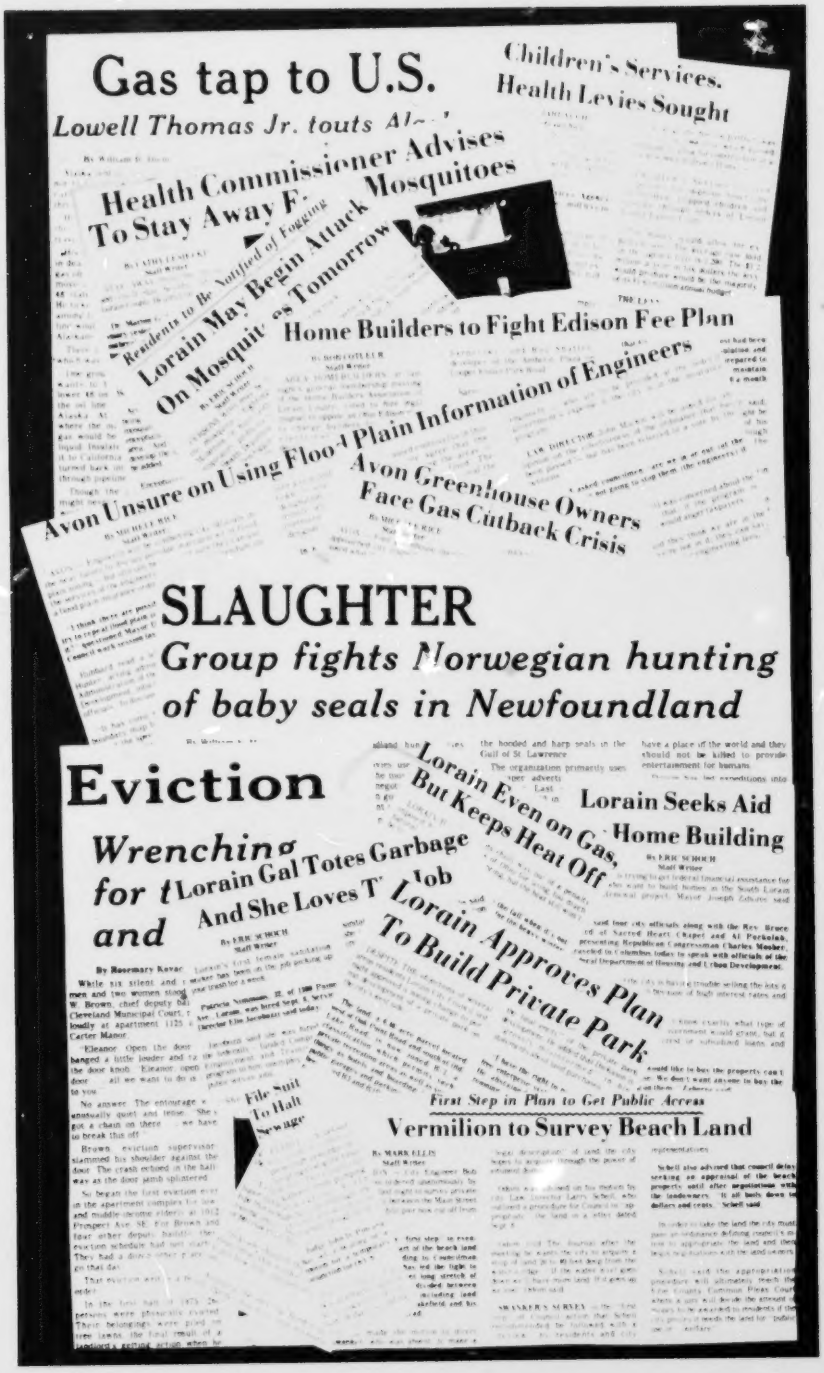
Things in our environment that do not belong there are called **pollution.** Pollution damages the ecosystem. Of course, pollution has been around for a very long time. Even before the time of man, the air was polluted by dust and dirt from volcanoes. Since the forces of nature were able to clean this small amount from the air, no great problems developed. With the development of human civilizations, however, the polluting effects from people were not so easily cleared. Eventually, laws were needed to control environmental damage. As early as 1273, the City of

London, England, passed a law against the burning of coal whenever Parliament — the English group of lawmakers — was in session. A man was actually executed for this in 1306.

Problems of the environment have become steadily worse. Today, there are not only more people around to do the polluting, but massive machines have been added to the list of pollution sources.

The people who work in the environmental cluster of careers are dedicated to our well being. They work to keep the environment healthy and to make our surroundings more enjoyable places in which to live. They make sure that food, water and air are safe. They check our health and prevent disease and accidents. They regulate the use of land, air and water, and plan for the future so that there will be enough natural resources for years to come. They work to solve problems of too much noise, too few good jobs, too much traffic, and too few nice houses. They help keep natural ecosystems in balance.

Go into *your* environment. Make a list of the good things and the bad things you see. What actions could you take to eliminate some of the problems? What kinds of people could you contact to help solve the problems — teachers? — scientists? — business people? — community workers? — city employees?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Home Builders to Fight Edison Fee Plan
Avon Unsure on Using Flood Plain Information of Engineers
Avon Greenhouse Owners Face Gas Cutback Crisis
SLAUGHTER
Group fights Norwegian hunting of baby seals in Newfoundland
Eviction
Wrenching for t and
Lorain Gal Totes Garbage And She Loves T Job
Lorain Even on Gas, But Keeps Heat Off
Lorain Seeks Aid Home Building
Lorain Approves Plan To Build Private Park
File Suit To Halt Sewage
First Step in Plan to Get Public Access
Vermilion to Survey Beach Land

Who Works in Environmental Careers?

Most environmental workers in this country have jobs in government agencies. In our society, the federal, state and local governments are given the responsibility to keep the environment healthy and safe. Laws are written and tax money is collected to carry out this responsibility. Part of our tax dollar pays environmental workers to enforce health and safety laws and to plan for the best uses of our natural resources. Another part of our tax dollar pays to educate the public to use better environmental behavior.

Some environmental workers have jobs in private companies. Later in this book, you will read about an environmental worker who checks the cleanliness of a bakery. The salaries for these workers come from the money we, the consumer, pay companies for their products and services.

Though it costs money to hire environmental workers, all of us really save in the long run. Later, problems too long neglected might force us to pay much more for expensive health care, property repair, and artificial substitutes for lost resources. Equally important, environmental problems affect our emotional well-being by reducing the quality of our daily lives.

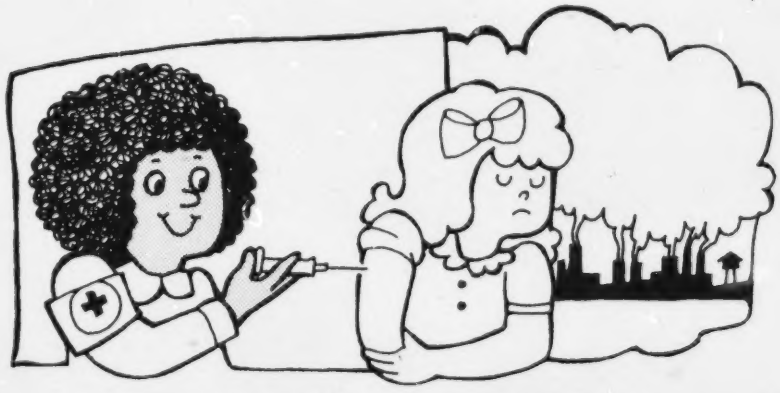
People who do not choose environmental careers can still help the environment through other careers. Many jobs in the Health, Agribusiness and Recreation Clusters have strong and important impact on the environment. Skilled secretaries, concerned lawyers, doctors, teachers, and hard working laborers also may work directly at helping to improve and preserve our natural surroundings. All of us can learn to live in *harmony* with the ecosystem and with one another. We can do this in our personal lifestyles, our consumer habits, and our choice of leisure activities. Through education, we must all learn to become better passengers on "Spaceship Earth." Education not only teaches us how to make a living, it also teaches us *how to live.*

Look in your newspaper for articles about environmental problems. Which agencies are most responsible for solving the problems? What are some of the jobs that most directly relate to the problems? How many of these jobs exist in your area?

What Do Environmental Workers Do?

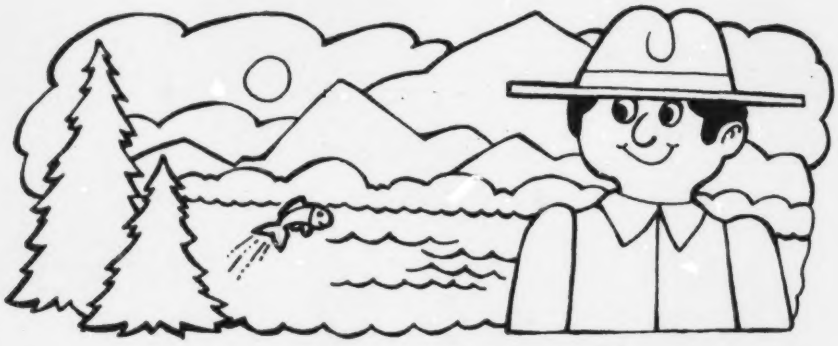
These are the four basic areas of environmental work: pollution control, health control, resource conservation and environmental planning. Workers in the environmental careers have many different levels of education and training that range from less than a high school educa-

Some environmentalists help control the pollution of air, water and land. They gather samples of the environment and **analyze** them. They also make sure that people obey protective laws.



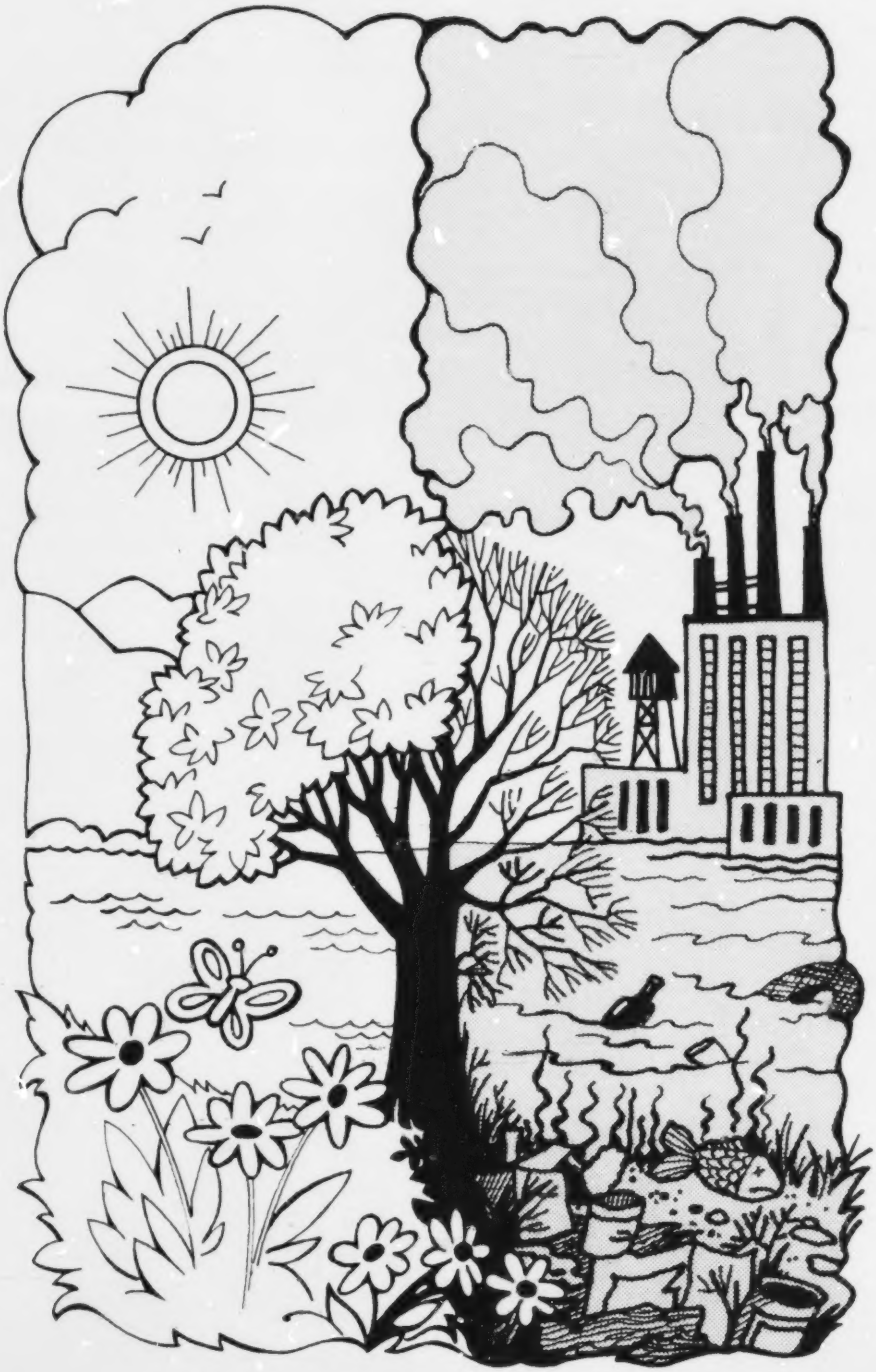
Some environmentalists work to keep people healthy by preventing diseases and accidents. They are concerned about the major effects of pollution on public health.

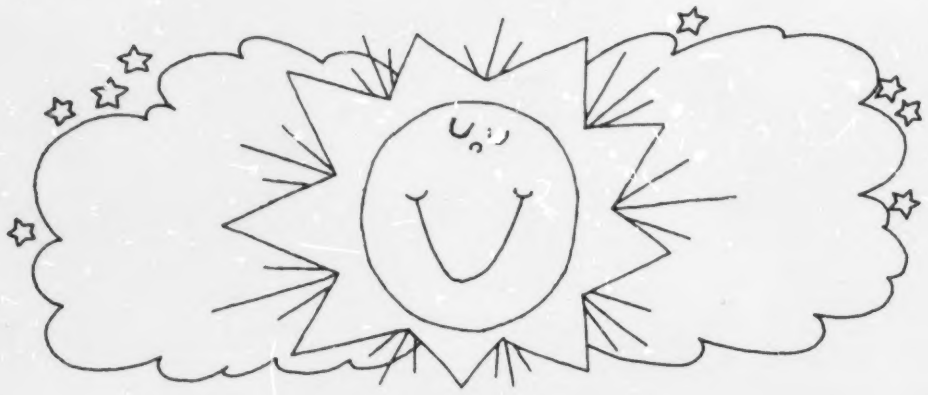
tion to highly advanced professional degrees. They may work indoors or outdoors, alone or with many others, with things or with ideas. There is a place in this cluster of careers for anyone who has an interest in people, the quality of our life and the future of our planet.



Many environmentalists work to preserve such natural resources as wildlife, forests, minerals and fuels. They help provide for the future. They serve both our physical and mental well-being.

Still other environmentalists are involved in planning how physical and financial resources can best be used. They help solve urban (city) problems by designing more beautiful and healthful surroundings.





Workers in Science and Research

These environmental workers become acquainted with the laws of nature and discover how the natural laws affect the world's ecosystem.

Life Scientists

biologist	studies how plants and animals live together
pathologist	studies the nature and causes of disease
animal ecologist	examines animal relationships to the environment
pharmacologist	researches effects of drugs and poisons on living things
forest ecologist	examines environmental effects on forests

Physical Scientists

chemist	analyzes the chemicals in soil, water and air
geologist	studies the make-up and movements of the earth's outer layers
hydrographer	studies the earth's water resources

meteorologist	researches the weather and atmospheric movements
physicist	examines the relationships between energy and matter
soil scientist	investigates the uses of soil

Social Scientists

economist	studies how people use their money and other financial resources
political scientist	evaluates the work of governments
sociologist	studies the ways people live together
statistician	describes the environment in terms of numbers and measurements

Workers in Education and Technology

These environmental workers plan how to use the knowledge we learn from scientists to make a better world.

Engineers

agricultural engineer	designs better farm equipment and methods
chemical engineer	designs chemical plants and machinery that handle chemical products
environmental engineer	uses technology to protect and improve living conditions
sanitary engineer	designs such systems as sewage disposal to protect public health

Health Technologists

industrial hygienist	identifies and eliminates health hazards in industry
field health officer	works to control communicable diseases among people
toxicologist	detects and analyzes poisons in the environment

Planners and Managers

landscape architect	designs attractive ways to use land
fish and game warden	enforces laws of conservation
forester	manages the uses of forests for recreation and economic purposes
watershed manager	maintains water storage facilities and regulates the flow of water
wildlife manager	cares for the animals in wildlife areas

Workers in Environmental Implementation

These environmental workers carry out the ideas of the researchers and planners.

environmental inspector	enforces environmental quality standards in the community
instrumental technician	builds and maintains machines that regulate environmental conditions
biological technician	helps the biologist analyze living organisms

noise measurements technician	works to limit noise and its bad effects on public health
land-use technician	records how land is used and enforces conservation laws
resource conservation technician	helps plan, build and maintain resource conservation areas
environmental tester	analyzes pollution content of air, water and land
mechanical tester	finds out if various machines and materials are polluting

Workers in Environmental Application

These workers operate the equipment and do the necessary physical work for environmental improvement.

gardener	maintains parks, nurseries and natural areas
janitor	keeps buildings clean, orderly and in repair
refuse collector	gathers the solid waste that society produces
wildlife attendant	maintains equipment and cares for wildlife in wildlife areas
incinerator operator	controls equipment that burns waste materials
waste water treatment operator	operates machinery that cleans waste water
reclamation foreman	sorts and redistributes material that can be **recycled**
solid waste disposal operator	disposes of solid waste material in dumps and landfills

Some Kinds of Jobs
In the Environment Cluster

"I find out what causes environmental problems."
"I plan ways to deal with the causes of environmental problems."
"I operate the machines that deal with environmental problems."
"I carry out the ideas of the researchers and planners."

We Work Together to Improve the Environment

A Close Look at Seven Careers In the Environment Cluster

Air Pollution Inspector

Waste Water Analyst

Environmental Health Technician

Public Health Sanitarian

Private Industry Sanitarian

Interpretive Naturalist

Assistant Urban Planner

Millions of tons of pollution go into the air each year.

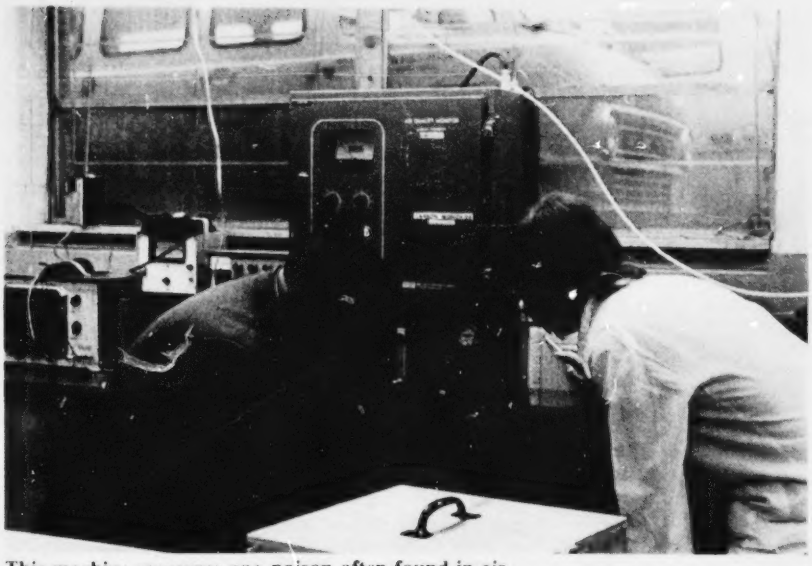
Henry Perryman Air Pollution Inspector

It is important that we learn to control the amounts of waste materials that are allowed to pollute the air. In recent years, more than 140 million tons of these **pollutants** have been discharged each year into the atmosphere.

One step in the control of air pollution is the hiring of people who can find out from where in the community the pollution gets started. Henry Perryman is a person who is responsible for this important task. He is an air pollution inspector, working with six other inspectors for a large Ohio city.

Mr. Perryman is a member of the city's Air Pollution Control Division, but he also assists county and state environmental protection agencies. He is *a field* person, which means he travels throughout the community in order to discover who is causing air pollution and by how much. In addition to his regular patrols to inspect industries, he also acts on specific complaints from the public. He may even take odor surveys to locate hidden sources of air pollution.

Field workers are often assisted by employees in other city bureaus. The improvement of the air quality is so important that it requires the cooperation of everyone who is able to help. For example, Mr. Perry-



This machine measures one poison often found in air.

man may go to the Technical Bureau to have air samples tested. Chemists and laboratory assistants analyze the samples. Machines in the laboratory and in the community test the air for odors, poisonous gases and suspended **particulates** (par tik′ u lits). Particulates are small bits of matter that float in the air. If you want to see some, clap two chalkboard erasers together and shine a flashlight through the dust.

Particulates are small bits of floating air matter that make it difficult for many people to breathe. You may wish to discover which parts of your environment have the most particulates. Smear a thin film of petroleum jelly over several glass microscope slides. Put them in out-of-the-way places, like windowsills and tops of doorsills, for a few weeks; then, examine the slides, using a magnifying glass or microscope. Which areas have the most particulates in the air?

All of the air quality data collected by the Technical Bureau are put together each day to determine an **air quality index,** a number that shows the level of air pollution in a city on a particular day. The air

quality index is often reported on the evening TV weather reports. A meteorologist uses the data to predict future air quality indexes. Weather is an important factor in air pollution control; it can clean the air or keep the air dirty; it can move the air or hold the air still.

You can make your own air pollution detection machine by putting a filter (fine cotton gauze pad lightly moistened with clear mineral oil) over the end of the intake hose of a vacuum cleaner. Test various areas to see how dirty the filter becomes.

Mr. Perryman may work at times with industrial engineers. He tells the engineers about any overloaded or improperly working equipment he may have seen on his inspections. The engineers then advise the offending companies on ways to improve machine operation. Sometimes, industrial engineers make surprise visits to make sure companies are obeying pollution control laws. They encourage companies to install pollution control devices that the laws require. It is important that equipment be installed properly and operated properly.

Another group Mr. Perryman works with are the legislative **analysts.** When Mr. Perryman finds that a company is polluting the air, he visits a legislative analyst, who will examine the offending company's **operating permit** to see how much pollution it is legally allowed. If the company is polluting too much, then it can be taken to a court of law for prosecution.

In his job as an air pollution inspector, Mr. Perryman also works with people in the community: doctors, police officers, firefighters, and other concerned leaders.

Preparing for a Job in Air Pollution Control

Air pollution control is a highly technical career field. People must be highly trained in this job in order to do it well. Though many cities will hire workers who have high school diplomas, a two-year college degree would be an advantage to anyone applying for work as an air pollution inspector or laboratory technician.

Mr. Perryman earned a four-year college degree in premedical science. This means that he completed the same college courses that are needed to enter medical school. His interest in public health was the reason Mr. Perryman entered a career in air pollution control. He then learned the specific knowledge he needed to become an inspector through on-the-job training. All employees of the Air Pollution Control Division, including the office staff, take a three-week training course. At times, a Division employee or an outside speaker will give lectures to the total staff on the scientific or legal aspects of pollution control. The Division also directs a smoke-reading school, where private citizens and air pollution workers from other cities can learn to identify the types of smoke caused by burning different substances.

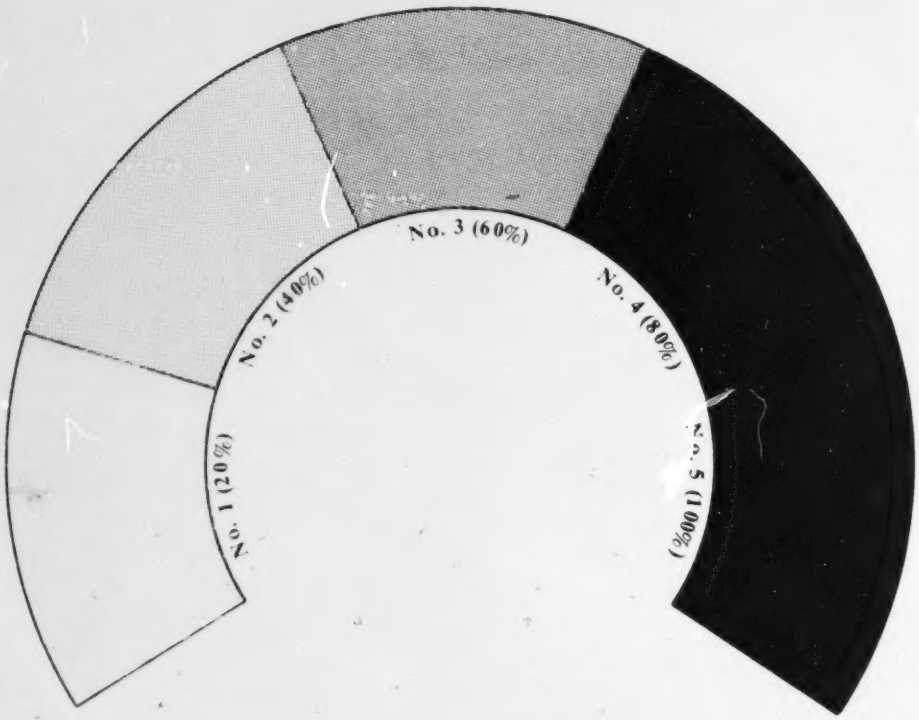
One way to determine the amount of pollution in smoke is to match its darkness with a chart of various shades of grays and black. The chart is called a Ringelmann Smoke Chart and is available free from your local lung association. The chart tells you about different qualities of smoke and how to report air pollution violators.

The Federal Environmental Protection Agency and several state agencies sponsor training courses in special subjects, such as the legal aspects of pollution control. Division employees are encouraged to attend these courses and to "grow" in their knowledge and skills that are so necessary. To advance, a person must earn promotion through continuous training.

Training begins in high school. Mr. Perryman suggests that an interested student take courses in chemistry to learn about the effects of pollution on health and property. He also believes that the student "can't get too much social studies." In addition, a future air pollution inspector should have above-average mathematical skills and be able to communicate well.

Continuous learning is a process of "growing" in this career.

Ringelmann Smoke Density Scale



Other than an interest in air pollution control and a desire to work outdoors, there are few limitations to this job. Inspectors must have good eyesight and cannot be color blind. Above all, Mr. Perryman believes inspectors must be "cool and diplomatic." This means that they must be able to deal effectively with people, even when some of the people may not want to cooperate. Though most industries do cooperate with Mr. Perryman and his coworkers in trying to reduce pollution, a few of them are hard to work with. Such situations require politeness combined with firmness. Poor cooperation on the part of some companies is the most difficult part of Mr. Perryman's job.

Many cities cannot afford to hire as many environmental workers as they need. Mr. Perryman also notes that there is small **turnover** in his Division because the people are so dedicated to their jobs and want to keep them. Perhaps in the future more money will be available for pollution control and more people can be hired.

Challenge and Dedication

The challenge of his job is what Mr. Perryman likes best. He must be able to discover the sources of air pollution, which can be like solving a mystery. One night, for example, citizens complained about a bad odor in their neighborhood. People were getting so sick from the smell that many had to go to the hospital. The police were called to investigate, but they, too, became sick. Since Mr. Perryman was on night duty, he went to the area to see what was wrong. He found the answer in fifteen minutes. A man had decided earlier to kill some insects in his garden, but he had not followed the directions on the package of insect killer. The solution was so strong and the man used so much of it, that the fumes entered the air. People in the neighborhood were told to keep their windows closed until the fire department was able to soak the garden with enough water to dilute the insect killer.

Mr. Perryman likes his job because he feels that environmental control is an exciting and growing field. He believes that everyone who works hard to improve the environment will find satisfaction and reward. The job not only provides training for the employees, it also gives encouragement for getting more education for personal growth. In this way, an air pollution inspector can become a person who makes a positive contribution to society.

Study a map of the sewage system in your area. Some types of sources of sewage are: homes, garages, factories, barns, schools. Where does their waste go in your community? Then what happens? Find out in a school science book how nature recycles water.

Dawn Myers — Waste Water Analyst

Have you ever wondered what happens to all the things that go down the drains of your home and school? When you drain a bathtub, wash dishes, flush a toilet, or turn on a garbage disposal, you probably seldom consider what happens to the water and the waste it contains. A city, however, *must* consider what happens to them.

Water carries waste products into the city's sewer system and ends up at a place called the water treatment plant. Here, water must undergo much treatment before it is allowed to be released into a clean water area. The water is thus *recycled,* to be used again later. Fifty billion gallons of liquid sewage are treated each year to be used again in the United States. This number may seem even more important when you consider that only .06 percent of the earth's water is available for use by human beings. (Much of the water that cannot be used as it is can be found in the oceans, frozen at the earth's poles and as moisture in the soil and air.)

Ask your guidance counselor, and write to several colleges and universities, for descriptive information on programs of study in environmental quality control. If you have interest in this important career field, use the information you receive as a reference when planning your high school courses.

Many people must work together on sewage treatment in order to make waste water clean enough to be returned to nature. Dawn Myers is such a person. She is a waste water analyst at a water pollution control center.

This plant cleans the water used by more than 45,000 people. Waste water flows through sewers into the plant. The raw sewage is put through a screen and then allowed to settle. The solid part that settles to the bottom is treated separately and becomes **sludge.** Air is pumped into the liquid part, and chemicals are added to it. After seven hours of treatment, the water is clean enough to be put back into a water supply.

Water used by more than 45,000 people is cleaned here.

Stir up some muddy water and let it settle for a few hours. See how the mud settles to the bottom. Pour some dirty water through activated charcoal (the kind used in fishtank filters) to see how water can be filtered. Place small sections of fruit (half a grape) into two bottles of water. Add some chlorine (from chlorine bleach) to one sample. Keep both samples warm for several days and note the difference in growth of decay matter. Chlorine is one of the chemicals added to water during treatment.

Ms. Myers works with eighteen other people in the sewage treatment plant. Operators read various pressure and volume meters, keep records and operate pumps, valves, incinerators and other valuable equipment. They must work indoors and out and have mechanical

ability. Analysts test water in the laboratory to find out how well the treatment is cleaning the waste water. They must have mathematical and scientific abilities. Together, operators and analysts help prevent water pollution and preserve the world's water resources. Since waste water enters the treatment plant all the time, they work on shifts around the clock, even on holidays.

Can you read a water meter? Learn to read your own water meter and find out how much water your family uses in a week. Divide the number of gallons your family uses by the number of people in your house. How does the average water used per person in your family compare with amounts reported by other class members?

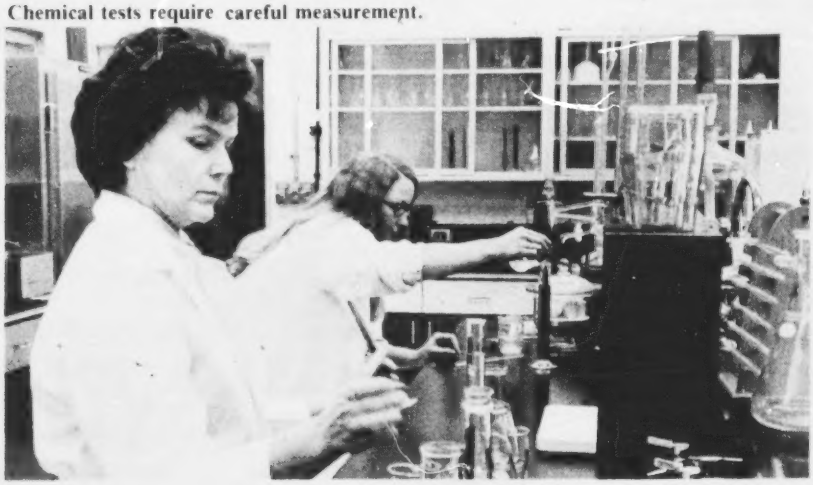
Ms. Myers works in an **organic chemistry** laboratory, which means that she specializes in tests for living things and for the chemicals made by living things. A test may take from just a few hours to as long as five days.

One of the tests she makes is a "suspended solids" test. This shows how much solid material is in the waste water. First, she weighs the small container that will hold the water sample. This is a white cup called a **crucible.** She then places a carefully measured sample of water into the crucible. The sample may be either untreated sewage coming into the plant, settled waste water, or treated water that is being pumped out of the plant. She lets her sample dry overnight and then reweighs it in the crucible. When she subtracts the weight of the crucible from this figure, she knows how much dry material has been left behind and how much moisture has left. She gives the test results to the plant superintendent, who uses the data to advise the plant operators on how to adjust the machinery to make the water cleaner.

Ms. Myers must be careful when she conducts her tests. She follows proper laboratory procedure, such as not touching certain equipment. Moisture and salt on her fingers could stick to a crucible and change her test results. A difference in weight that equals the weight of a hair could be very important. Cleanliness and precision are important characteristics of a laboratory analyst.

Ms. Myers knew much about chemistry before she started working at the waste water treatment plant. Before coming here, she had worked in the prescription department of a drugstore.

Chemical tests require careful measurement.



Certification by the State

People who work in sewage plants are usually certified by their states. In a typical state, such as Ohio, there are four classes of *certification.* A person with a high school education must work for one year before taking the test for a Class 1 license. With no high school diploma, a person would need five years of plant work before taking the test. A person with Class 1 certification is called a plant helper.

A person with college training in a related field would need a year of experience in the plant before being tested for a Class 2 license. A Class 2 operator can work as a superintendent in a small treatment plant. A person with a Class 3 license can be a superintendent in larger plants, but can also work as an advisor and consultant to professional engineers, other cities and private business.

A Class 4 operator must have run a sewage plant for at least five years, written a professional report on some aspect of water treatment, and made a positive contribution to the study of waste water treatment.

Waste water treatment workers do not need to go to college to advance in their careers. They can advance through on-the-job experience and by taking special study courses. Ms. Myers is presently taking such a course in **bacterial sampling,** attending three classes a week for several months. Soon, she hopes to take the state examination for certification as a bacterial laboratory technician. She will then be able to work in bacterial laboratories in hospitals, health departments, food processing plants, as well as water treatment plants. As a specialist in her field, she will be able to teach classes in this subject.

If your class is able, take a field trip to a waste water treatment plant. Find out from the people there what they do and how their jobs are important to your community.

Ms. Myers's salary is paid by the city in which she works. The city gets much of the money for salaries of its employees from taxes, and taxes come from the residents of the city. Ms. Myers feels it is important for the people to learn about the services provided by the

waste water treatment plants. Tour groups often come through the plant, and Ms. Myers shows the visitors how she tests samples of waste water and treated water. She explains that the clean water must meet standards established by both the state and federal governments.

Ms. Myers likes her job because she has a great deal of personal freedom. She arranges her own time schedule for doing the tests that need to be done. She must be responsible for having tests done well, because the health of many people depends on her work. She feels that she has developed an environmental concern. Ms. Myers says she now notices many environmental problems that she had not noticed before.

The advantage that she likes best about her job is that it has a future. Sewage plant workers keep learning and advancing as long as they keep working and as long as the population keeps increasing. More people will need more sewage plants.

Trained waste water analysts and operators are greatly in demand. They may often move around the country in order to learn and to take advantage of good job opportunities. There are many different sized plants. The larger plants may hire their own pipefitters, electricians, chemists and machinists, but in smaller plants a single worker may do many different kinds of jobs. Regardless of size, all employees of waste water treatment plants realize that their jobs have an important effect upon the total environment.

Ms. Myers was hired for her job partly because of her background experience and interests. What kind of job do you want? Pretend someone is interviewing you for her job, and try to list the things in your background that would qualify you for the job.

Lillian Craig

Environmental Health Technician

Lead poisoning is a very serious illness. It can cause kidney disease, mental *retardation* or even death. A person with lead poisoning may have stomachaches, nausea, and a feeling of listlessness, or a person may not show any *symptoms* at all. Sometimes, children get this illness because they chew on things that contain lead, such as painted windowsills and furniture, or because they eat peeling, flaking paint chips that contain lead; however, adults who work near lead, such as house painters and lead smelters, may also become poisoned.

All people have some lead in their systems, but the body naturally takes care of it unless the amount is too large. The amount of lead in a person's body can be tested by drawing a small amount of blood and analyzing it. The test will show whether the blood contains a normal level, an elevated level, or a poisoned level of lead.

Lillian Craig is an Environmental Health Technician. A health technician can specialize in such areas as rodent control, food and drug control, radiation and solid waste disposal, water and air pollution control, and lead poisoning prevention. Ms. Craig works to prevent lead poisoning

For many years, Ms. Craig has been involved with community volunteer work. She has worked with people for welfare rights and has helped get a health center built in her neighborhood. She knows the problems of the people who live in the neighborhood because she lives there, too—she understands their concerns. She has always wanted a job where she could serve and work with people and still support her family of three children; thus, two years ago, she applied at City Hall for a public service job. She was interviewed and hired as an environmental health technician.

Go to a local company or community agency and ask for a job application. Practice filling it out. Find out the kinds of things that employers want to know about people before hiring them.

At the time she got the job, Ms. Craig had a high school diploma but no training in environmental health. Since the lead poisoning program was a new one, however, only the director and one chemist had any experience with lead poisoning. All the people on the staff needed to help one another learn. For example, a registered nurse taught Ms. Craig how to take blood samples from children. That was something she thought she would never learn because it often hurt the children. She now realizes that "you can do anything you put your mind to," and the small amount of pain it causes might help save a child's life.

Ms. Craig learned other things about lead poisoning by reading and asking questions. She found it important to be willing to learn and grow in knowledge. Many environmental health technicians have two-year college degrees, but others, like Ms. Craig, do not.

Testing for Lead

Each weekday, Ms. Craig spends her time taking blood tests. Parents sit with the child while Ms. Craig takes a small blood sample from the side of a finger. Ms. Craig tries to make friends with the child and distract its attention by pointing to a colorful mobile hanging from

A sample of blood is taken from the child's finger.

her office ceiling. Her own experience as a parent helps her in putting parents and children at ease. All blood samples are sent to the city's lead-detection laboratory. When the results are returned, Ms. Craig prints them on the child's record card and then calls the parents to tell them the test results.

There is a lead poisoning technician like Ms. Craig in each of the city's several health centers. The city also employs environmental health technicians as field workers in the lead program. Each day, the field worker goes to assigned homes and apartments to inspect the walls and woodwork for signs of trouble. To do this, a special machine, like an X-ray machine, tests as many as 15 layers of wall covering to see if any layer contains too much lead. If there is too much, or if the wall paint is chipping or bubbling, the inspector then must work with the owner or tenant to solve the problem. Often, an inspector will take adhesive wall covering and stiff wire brushes in order to help the residents cover or remove dangerous paint.

Paint can be tested for dangerous lead.

Do a lead poisoning examination in your own home or school. Look for chipping or peeling paint that a child might be tempted to eat. Then work with others to remove or cover the dangerous areas.

Do a lead paint inventory in your neighborhood, or write a booklet about the hazards of lead poisoning, and conduct a community education program about it.

Education Is Key to Lead Control

Since people must learn about the dangers of lead poisoning and the methods of preventing it, Ms. Craig spends much of her time during the day and often in the evening leading educational discussions with school health classes and PTA groups. From there, facts about lead

poisoning spread from neighbor to neighbor. People can then check their own homes and bring their children into the health center for tests. Though it is illegal to use indoor paint that is more than 1 percent lead, Ms. Craig feels that educating residents has better results than threatening them with laws.

Ms. Craig works with many people in the lead program. The staff is very friendly and cooperative. Her boss is "fantastic," and her two helpers from the Neighborhood Youth Corps work ten to twenty hours a week filing records and learning about the program. Volunteers who are careful and can keep confidences are always needed, and this type of experience is helpful in choosing a career.

One way staff members help each other is with language. Lead poisoning strikes all cultural and racial groups and all economic levels. Ms. Craig has used the help of staff members to interpret Arabic, Italian and Spanish. In fact, she has learned enough Spanish words to make friends with the young Spanish-speaking children who come for tests. Dealing with people is the part of her job she likes best.

The environmental health technicians in every one of the specialized fields must have a sincere concern for people. As Ms. Craig points out, the job is much more than "just a paycheck." It has real meaning to those who work at the health center, and it has real importance to the entire community. There are moments of personal success also. At one time, Ms. Craig visited the home of a child who had lead poisoning, but she was unable to find chewed or peeling lead paint. It took her awhile before she discovered that the child had eaten ice from a car's exhaust pipe. The ice contained high levels of lead from the gasoline.

The environmental health technician must be clean, careful and precise. At present, Ms. Craig is one of a few female health technicians in the city, but she believes more and more women will enter this field as new positions open in both government agencies and in private industry. Some people with physical disabilities may find they are able to perform the duties of this job. A career as an environmental health technician offers many opportunities to feel successful by serving the community.

Curtis Reynolds
Ernest Mayo

Two Sanitarians

Sanitarians investigate health conditions in many public and private places: hospitals and rest homes, schools, hotels and motels, prisons, food plants and restaurants, swimming pools and beaches, camps and parks, and garbage disposal sites. They inspect food storage and service to make sure that food and the people are clean and that food is kept at the right temperature to prevent disease. They check out X-ray machines and microwave ovens to find out if the radiation is leaking. They also investigate recreation areas for safety so that accidents do not happen. An important part of their job is preventing rats and insects from infesting places and causing disease. They test water and air for purity. Also, they inspect working areas to make sure that people have enough light and heat to be comfortable. All of these things they do are for one purpose—*to protect public health.*

Public Health Sanitarian

Curtis Reynolds works as a sanitarian for the Environmental Health Services Division of his city's Department of Public Health and Welfare. His office is right in the middle of the territory he takes care of so that he can be close to his work, and people can get in touch with him easily. Each sanitarian in the city has a certain area to patrol, and Mr. Reynolds is responsible for inspecting all the food services, swimming pools, barber shops, laundries and schools in his area. Sometimes, acting on a complaint, Mr. Reynolds inspects private homes and apartment buildings. He sets his own schedule and is responsible for doing assigned work. The people who work in food operations and other public places do not know when he will arrive, so all inspections come as surprises.

Each of the six schools in his area is inspected twice a year. He checks the buildings and playgrounds for safety and litter, the drinking fountains and toilets for cleanliness, and the cafeteria to see that food is properly stored and prepared. He fills out an inspection sheet and notes each problem that exists. By the next visit to a school, each problem should be solved. He works with principals and custodians to make sure that students learn in a clean, safe environment.

In places where food is stored, processed, prepared or served to the public, Mr. Reynolds must check many things. First, all employees must be healthy and have clean habits. Second, there can be no evidence of rats and insects. Walls cannot have lead paint chipping off and falling into the food. Third, food must be stored and prepared at appropriate temperatures. Fourth, dishwashing machines must work properly, and the water must be hot enough to kill disease germs. There are many other areas that must also be checked.

Many things and places must be checked to assure public safety.

Do a sanitary inspection of your school. Check the kitchen and cafeteria for cleanliness. Make sure the playground is safe and the yard is free of litter. Look at safety inside, too. Are the stairs and gym equipment safe? Are the fire extinguishers handy? Is the lighting good? Are the toilets, locker rooms and drinking fountains clean? If you find problems, what actions can be taken?

Occasionally, other city departments, such as the Public Safety Department, might ask Mr. Reynolds to check certain problems. He often reports his findings back to these departments, or to the Street, Building or Housing Departments for follow-up action.

If places he inspects do not follow his recommendations, he can give the owners summonses to appear in court so they can explain their reasons. If they do not obey the summonses, they may lose their licenses to operate. This can be unfortunate. Mr. Reynolds prefers to help people, such as food service operators, learn cleaner and safer working habits.

Mr. Reynolds has great responsibility to make wise decisions. His decisions can affect people's livelihoods, the ways they make their livings. Should a sick person be allowed to work? Should a dirty restaurant be allowed to remain open? A good sanitarian tries to look at both sides of a problem. No matter how sympathetic he may be, however, Mr. Reynolds realizes the importance of doing his duty to the public and seeing that health laws are carried out. He tries to persuade owners and operators to follow the laws and explains why they should be followed.

Private Industry Sanitarian

Not all environmentalists work for government agencies. Many of them are employed by private industry. Mr. Ernest Mayo is the Director of Sanitation for a large bakery. Each day, he inspects the bakery, inside and out, to see that everything is safe and clean. He checks raw materials, such as flour and sugar, to make sure that each is free of insects and dirt. The bakery employees count on Mr. Mayo and his staff to make sure that their working environment is kept healthy. He is in charge of 35 people, called sanitors. They are responsible for keeping the plant and equipment clean.

Mr. Mayo received his early training as a sanitarian in the United States Navy, where he was a Storekeeper 1st Class. He also worked as the Building and Service Maintenance Supervisor. This experience gave him a good background in dealing with food sanitation. After leaving the Navy, he completed professional and college courses in food-plant sanitation, industrial safety, and principles of medical science. Today, Mr. Mayo continues to study so that he is aware of new and interesting changes in the field of sanitation. He wants to apply modern methods to improve the environmental conditions of his bakery. He thinks high school students who want to become private industry sanitarians should learn the basic principles of chemistry and biology.

Teaching workers correct health practices is important for public safety.

The need to make many decisions is a daily part of Mr. Mayo's job. He works ten to eleven hours a day and is still available at home to return to the plant when a big problem arises.

As the Director of Sanitation, he must be responsible for the department's yearly budget. Each year, the bakery management decides how much money it will spend to keep the plant clean, and Mr. Mayo must direct his efforts to stay within the economic limits.

Sanitation Education

Teaching people correct health practices is important. In this way, both Mr. Reynolds and Mr. Mayo prevent new health problems, as well as correct old ones. They work with people to help them have more healthful living and working environments.

How would a sanitarian view your community? Do a survey of your neighborhood, looking for rats, vermin, litter and stray animals. How often is trash and garbage collected? Do citizens store trash in ways that may cause problems? Can any of the problems be solved by educating the public? How can you proceed?

If people care about their environment, they can work to make it better. The sanitarian can help.

Perhaps the most important things for a future sanitarian to learn are the sciences and social studies. A person needs to learn both the facts about sanitation and the ways to deal with people. Oftentimes,

a background in psychology and the humanities can be helpful, too. Even today, Mr. Reynolds and Mr. Mayo regularly attend special classes to learn improved methods of protecting public health. In this career field, learning can never stop.

Private industry sanitarians and public health sanitarians do much the same work. Mr. Mayo comments that in public health, a person may have more job security, but Mr. Reynolds feels that the sanitarian in private industry can keep a closer look at particular, day-to-day problems. Both these people work in their own ways to protect the environmental health we all enjoy.

Sanitarians keep a careful watch on public health.

Kent Scott — Interpretive Naturalist

Having public parks near highly populated areas was a new idea in the 1850s. It was then that Frederick Law Olmsted designed New York City's famous *Central Park*. He wanted to preserve a space free of pollution and crowding—a place for people to enjoy a natural setting of peace and beauty. Soon, people began to ask for the creation of parks along the scenic Hudson River, the subject of so many beautiful paintings. From there, the idea spread across the nation. Parks were built to preserve natural areas and to keep places free of commercial development and residential crowding.

Natural areas are valuable for many reasons. Green plants produce oxygen that freshens the air, reduce noise from surrounding communities, protect soil from erosion and provide wildlife with places to live. Parks are tension reducers, where people can escape the pressures of other busier environments. They are natural "classrooms" for learning the valuable lessons of the balance of life.

Kent Scott is an interpretive naturalist. He *interprets* the wonders of nature to people who want a better understanding of the values and importance of the ecosystem. Mr. Scott believes that people should have more contact with their natural environment and that public parks can provide them with nondestructive opportunities to learn about it. Parks are not only places for plant and wildlife preservation but also are designed for recreation and education. They must be used carefully, however, for even the mere presence of a human being may disturb the ecosystem.

An interpretive naturalist must be well trained to help people understand and use the outdoors. The naturalist must have a thorough knowledge of the natural ecosystems. Mr. Scott earned a Bachelor of Science degree from the University of Miami of Ohio, where he took numerous science courses, many of which were in zoology (the study of animals) and botany (the study of plants). He then taught high school science for three years. While preparing to become an interpretive naturalist, Mr. Scott took advanced courses, giving him an opportunity to learn about the ecosystems of many different areas of the world.

The naturalist can gain knowledge away from school, also. Much of Mr. Scott's training came from his hobbies and life-long interests in natural science. In fact, he believes the best naturalists have these early interests and a great love for the outdoors. Most seem to be "born to this kind of work."

Do you have a pet animal? If so, you may wish to study some of its habits. How might its life be changed if it lived in the wild? Which of its behaviors would not be helpful in the wild? Some people keep wild animals as pets, which is most often harmful for the animal. Many wild animals are protected from private ownership by federal law.

Students can learn much on their own about natural science. Books and magazines can be helpful, as well as membership in one of several naturalist clubs, such as the Audubon Club and the Sierra Club. Museums often conduct programs and give advice to young nature enthusiasts. Also, high school vocational-agriculture courses can provide natural science training. Local and state parks often hire students as summer help, as they did Mr. Scott, and give them experience on the job. Many parks sponsor Scout and Explorer troops that specialize in outdoor programs.

Naturalists find it hard to separate work and leisure time. The irregular hours are not those of the average job. For example, Mr. Scott lives on park property, and even a single evening stroll may alert him to some park problem. He often works at night, giving lectures, leading hikes or teaching young people. Since a large part of his job is teaching the public, he must be able to speak well and know the rules of English grammar. He also writes and takes photographs for a nature newsletter.

A stuffed pheasant is part of the park's wildlife display.

Visit a park and talk to the people who work there. Ask them about their jobs—what they find most interesting, how they deal with people, what they do for leisure time, and where they find their greatest problems.

Forest Ecosystem

Most parks are **forest ecosystems.** This means that the balance of plant and animal life is like that found in a tree forest. There are special problems in this kind of environment. One problem Mr. Scott has, for example, is dealing with a surplus of deer. With no natural enemies in the park, deer herds become too large. When this happens, there is not enough food to feed them. Should they be allowed to starve? Should the park allow people to hunt them? Should some be captured and moved to other areas?

In a large park system, many of the jobs of the naturalist are divided among people who specialize in certain areas. For example, a forester specializes in the study of trees. A landscape architect specializes in arranging plants, picnic areas and nature trails. Mr. Scott once worked in a very large park that had ten naturalists, each specializing in one aspect of the park. Now, in a smaller park with only two naturalists, he does many more kinds of things. Outdoors, he helps clear trails and repair natural or human damage. Inside, he works on the park library and helps plan for park activities and educational programs.

Some of the most important park employees are the maintenance workers. It is up to them to make good, safe trails and to keep the park clean and attractive. Naturalists and maintenance people work together as a team to keep parks pleasant, to preserve them for the future, and to teach people to use and understand the natural environment.

Do you like outdoor activities? Make a list of your favorite hobbies that take place outside. How many do you do with others than yourself? How many require you to travel away from your own yard? With how many could an interpretive naturalist help you?

Steve Szanto Assistant Urban Planner

Why must a community plan for change? After all, doesn't a community naturally grow as people move into it and as babies are born in its hospitals? Does not a community naturally die as more people leave it than enter it? To some extent, change is unplanned and uncontrolled in many communities. A community may grow so rapidly that it is unable to satisfy the needs of its people. When that happens, it begins to die. Only when it *plans for change* can a community hope to deal with the needs of its people.

Planning for change means deciding how many schools and libraries to build, where to place sewer systems and waste disposal sites, where to build parks and roads, and how many law officers, fire fighters and sanitation workers to hire. Businesses must plan in order to provide services and products for future customers; utility companies must plan in order to provide gas, water, electricity and telephones for new homes and factories, and health centers and recreation centers must plan in order to meet the needs of a growing population.

Many communities hire people to help plan for change. Steve Szanto works as an assistant urban planner, and his job is to help his city become a more interesting and healthful place in which to live. He has lived on a farm (a **rural** area) and in the city (an **urban** area), and he likes both kinds of environments. When as a young man it became necessary to make a decision, Mr. Szanto chose a career in the city environment because there he felt close to such things as colleges, libraries, the theater, music, and sports. He finds public transportation another advantage of city life. He takes a bus to work in the day and, at night he takes a bus to his classes at one of the universities.

After graduation from college, Mr. Szanto took advanced courses in urban planning. He studied statistics (analyzing numerical facts and predicting how those facts might change in the future), research methods (ways to find out facts of the present and to test predictions for the future), political science (examining the principles of different forms of government), and computer science (learning the principles and operations of computers). To do well in these courses, an urban planner should have a good high school background in mathematics and social studies. An urban planner should also have a good English background in order to write clear and accurate reports of planning ideas for people who have not carefully studied urban problems.

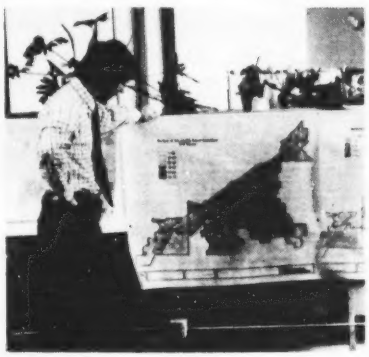
Interest in How People Live Together

Mr. Szanto is interested in how a city can be planned in ways that help people live in a balanced urban environment. The modern city must be a place that is **responsive** to the needs of its people. People who once had few or no choices of **lifestyle** must now be free to build productive and interesting lives for themselves. Mr. Szanto has accepted the challenge to help plan the changes that are required for a truly responsive city.

There are two kinds of urban planners: the **traditional** planner and the **advocacy** planner. The traditional planner usually works in newer communities, planning how vacant lands might best be used for urban growth. Such a planner decides what kinds of buildings and facilities should go where, and how large building lots and home sites should be. The making of good **zoning** laws is very important to insure that working areas and living areas of a community do not become confused and harmful to public well-being.

Look at the map of your own city or of a nearby urban community. Which areas are zoned for private homes, industry, stores, entertainment, apartment dwellings, and government buildings? Does there appear to be a plan to building zones, or are the zones mixed and confused?

Mr. Szanto is an assistant advocacy planner. This means that he learns of the needs of the people, helps develop plans to satisfy the needs and then helps convince the city administrators that money should be provided to carry out the plans. Most advocacy planners work in older cities. While traditional planners try to prevent problems by planning newer cities, advocacy planners try to correct problems by changing older cities.



A city map can show such things as zoning, traffic flow or population distribution.

Look at the maps of two older cities: carefully planned Washington, D.C. and unplanned Boston, Massachusetts. Study the history of how these two cities grew and developed. Compare these two older cities with two modern planned cities: Reston, Virginia, and Columbia, Maryland.

Assisting Means Doing Research

Mr. Szanto is an assistant to two advocacy urban planners. One of the planners specializes in the downtown area and urban renewal and the other specializes in urban housing. As their assistant, Mr. Szanto does research for them by collecting facts about various problems in the city. He spends much of his time in history museums, public and university libraries, and the county and city record offices. In these places he looks up old documents, census records, city directories, and tax assessment books. Learning the facts of the past is necessary to solving the problems of the present. For example, one of the subjects Mr. Szanto researched was an urban renewal project. He found out which people had lived in the project area for a long time and which people had recently moved into the area. He then found out how differences in income (money earned) among the people affected the community. He learned much of the information he needed by studying housing loans at banks.

Interview your parents and neighbors. How was the community different 10 years ago? . . . 20 years ago? . . . 40 years ago? Ask people what brought about the changes. Do you like this kind of research?

Another problem he worked on recently was related to tax delinquency. When a person is unable to pay the taxes on a home or store, the owner is said to be delinquent, and the property is often given to the state. Mr. Szanto researched tax delinquencies to find out

who had owned the lost properties and the amounts of taxes owed. He gave this information to one of the planners, who was trying to learn the causes of tax delinquencies in order to help present land owners. In this way, the city is better able to help its people deal with problems.

Another important task that Mr. Szanto often does relates to predicting the cost of planning projects. If plans are clearly written and costs are carefully figured, the federal government will often provide part or all of the money the city will need. The federal government encourages cities to plan urban projects. It wants to help cities become better places in which to live.

Being an urban planner means being able to adjust to new situations. Usually, a young urban planner travels often and lives only a few years in a city before moving on. In this way, the beginner can learn new ideas through new experiences with many different people. Mr. Szanto is growing in his own professional life. He will soon finish his advanced college work that will enable him to become a financial planner for a state government or the federal government. This means that he will plan for the effective use of tax money for meeting the needs of people and improving the environment in which they live. Though most urban planners today work for city and county governments, Mr. Szanto feels that in the future more and more planners will be hired by state and federal agencies.

You and your class may wish to create a "model" city. Remember to include places for factories, businesses, parks, hospitals, airports, sewers and sanitation sites, and homes. Map the roads and streets for the easy flow of traffic and provide for mass transportation systems. Estimate how many people can live in your city and how large the service departments must be. Compare your model with a real city of about the same size. Are there similarities? Are there differences?

Did You Know . . .
That You Have Started
To Prepare for Your Career?

The subjects you are studying right now will help you know what you enjoy and which talents, skills and abilities you might have for an environmental career. The skills and abilities you learn now will help you develop your special talents in this or in any other career field.

Take advantage of special courses in science, social studies and mathematics. Practice your writing and speaking skills in English class. Take part in groups and clubs that deal with the environment.

Subjects of Special Importance

English
Mathematics
Science
Social Studies

Other Useful Subjects

Art
Health and Physical Education
Home Economics
Industrial Arts
Music

How Are These Subjects Used in the Environmental Careers?

Some Ways That School Subjects Are Used In Environmental Cluster Careers

Workers in Environmental Cluster careers find that the subjects they studied in high school have helped prepare them as follows:

English	*Environmental workers need to be able to communicate with the people they are trying to serve:*
Research Workers	to prepare clear and understandable reports of their research
Education Workers	to teach people about the needs of their environment and how a balanced ecosystem may be maintained for the benefit of all
Implementation Workers	to write reports about the effectiveness of carrying out plans for environmental improvement and control
Mathematics	*Environmental workers use mathematics as a tool in solving problems:*
Science Workers	to analyze the causes of problems and to record the effects of experiments
Research Workers	to gather and interpret statistical information and to predict probable changes to the environment.
Technology Workers	to compute the balance of natural and human-made forces in the design of environmental **facilities**
Implementation Workers	to record the results and effects of environmental control efforts
Application Workers	to read various kinds of measuring instruments (meters) and to operate machines within the limits established by those measuring instruments

Science	*Environmental workers use scientific principles to learn about and deal with every aspect of the world's ecosystem:*
Science and Research Workers	to discover the ways natural forces affect our world and how the forces may be used to our best advantage
Education and Technology Workers	to use scientific principles in the design of environmental equipment and facilities and to instruct others in their use
Implementation Workers	to interpret the scientific reasons for the plans and ideas that they are to carry out
Application Workers	to appreciate the importance of their work in maintaining the natural balance of the total world
Social Studies	*Environmental workers must understand the needs of people, how they live together and how they govern themselves:*
Research Workers	to use history for interpreting the importance of human problems, to apply political science for developing plans for change, and to use economics for computing financial effects of changing the environment
Technology Workers	to prepare plans for improving our surroundings in ways that satisfy human needs
Implementation and Application Workers	to understand why people use the environment the way they do and to help them understand the importance of protecting natural resources

Other Useful School Subjects

Art	Many environmental workers must be aware of the visual effects their plans will have on people. People need surroundings that are not only useful but also pleasant to look at. Landscape architects, urban planners and park naturalists create well-designed and beautiful environmental locations. Such efforts require a knowledge of artistic balance.
Physical Education	Many environmental careers deal directly with the health and physical fitness of people. It is important that such workers know how a healthy body can be protected from disease and accident. In addition, many environmentalists work outdoors and must keep their own bodies physically fit.
Home Economics	The environmental workers who deal with people in their homes must be aware of economical and healthful housekeeping practices. Environmental health inspectors, urban planners, sanitarians and others must use home economics skills in their daily work.
Industrial Arts	Many environmental problems are caused by machines and industry. New machines and industries are needed to solve the problems of the old. Environmental engineers and mechanics will design and operate the safe, quiet and efficient machines of the future.
Music	A few environmental researchers study the science of music and apply their knowledge to improving the quality of sound in the environment.

AWARD
FOOD
STORE

Why Should You Choose a Career?

Throughout this book, there have been many examples of the importance of environmental careers to the health and well-being of every person on "Spaceship Earth." All of us depend upon the work of people in environmental careers. From a personal point of view, it is easy to see why others should work for our benefit. Perhaps at this time it might be helpful to consider briefly some reasons why you should begin planning for a career at all, whether it deals with the environment or any other cluster of careers.

One reason to work is to *earn money.* Long ago, people had to work to make the things they needed and trade for the things they could not make. Today, people still trade, but instead of using things they make, they use money they earn. With money, people trade their work at a job for food, shelter, clothing, entertainment, and other material needs.

Another reason to work is to satisfy feelings. *People like to feel useful.* One of the first things people feel when they have no work is boredom—"there's nothing to do." One of the first things people feel when they do have work is usefulness—"there's something to do." Work must be useful to be satisfying. If you have ever had to do "busy work," work that you did not consider useful, then you can understand this feeling.

People like to feel needed. All people, including you, want to believe that their work is important in some way to others. If no one has a need for their work, then the people feel that what they do is meaningless—"Why work if no one cares?" But, when others put a value or meaning on their work, the people feel that they themselves are needed—"My work is important to others." If you have ever done something that others have totally ignored or that others felt was *stupid,* then you can understand this feeling.

People like to feel proud. People work to accomplish things they can be proud of. Sometimes, pride comes when others say, "Hey, that's a really good job you did." Others do not always have to know what one has accomplished in order for that person to feel proud. Pride also comes when a person can say, "Hey, I really did a good job." If you have ever had a good feeling about a job well done, then you can understand why people work with pride.

People like to feel that they belong. People who work together form a kind of *family*. Friendships are made. People become loyal to one another. In some careers where people often move from one job to another, a major problem that the people have is making friends with fellow workers. In other cases, when people cannot work at all, a feeling they often have is isolation—"I'm here alone while everyone else is doing something." A career provides one way for people to feel that they belong.

Working is a way that people satisfy the many needs and feelings they have. You have the same needs and feelings. You work at home and in school; you work alone and in groups; you work at tasks you enjoy and at tasks you do not enjoy; you work with things and ideas; and you even work at having fun. You will still have these needs and feelings in adulthood; then, you will satisfy many of them in a career.

One group of careers that you may wish to consider in your life plans is the Environment Cluster. Are there jobs in your neighborhood that might give you work experiences with environmental careers? Your guidance counselor can help you find summer or after-school work experiences, or you could volunteer your services to a community project to improve the environment.

Which of the jobs listed in the book existed five years ago? . . . fifty years ago? What kinds of jobs are likely to exist in the future? Some career books predict how many environmental jobs will exist when you begin your career. Ask the librarian or guidance counselor for help.

Can You See Yourself in Some of These Jobs?

Biochemist

Be curious about why things happen
Be observant and persistent in laboratory work
Be imaginative and systematic in approaching problems
Have more than a four-year college education

Sanitary Engineer

Be able to evaluate mathematical data
Have manual dexterity and good eyesight
Be willing to make decisions that others must follow
Train for state certification
Have a four-year college degree

Field Health Officer

Be able to communicate well
Like to work with many people
Be clean and careful
Work well under pressure and stress
Desire possible work in other countries
Have a four-year college degree

Biological Technician

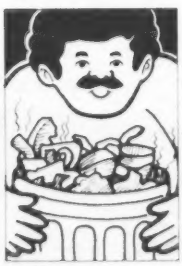
Like science and laboratory work
Be curious and thorough in problem solving
Have good eyesight for microscope work
Be reliable and accurate in observations
Have training beyond high school

Soil Conservationist

Be willing to travel
Like to solve problems by means of scientific tests
Be able to communicate well
Be curious and patient in making observations
Desire to help people and the environment
Have a four-year college degree

Environmental Inspector

Have patience and kindness when dealing with people
Be able to communicate well to educate people
Have good judgment in making decisions about enforcing environmental laws
Like solving problems with scientific tests
Have a high school education



Refuse Collector

Like regular, routine work
Be physically strong and healthy
Like to work on a team in the outdoors
Be able to operate machinery
Train on the job

Instrumental Technician

Like to work with tools and equipment
Be able to solve mechanical and electrical problems
Be patient and accurate in detailed work
Be able to keep neat, accurate records
Have a two-year college or technical degree

Waste Water Plant Operator

Like physical work with large machines and systems
Have muscle coordination and good health
Train on the job
Be willing to study for state certification
Like routine work on shifts
Desire advancement as experience and training grow

Environmental Tester

Be careful and accurate in measuring
Be able to tell colors apart
Like science and scientific testing
Be able to keep neat, accurate records
Be patient and dependable
Desire work in a laboratory
Have a high school education

Landscape Architect

Appreciate the beauty of plants
Be precise and careful in making plans
Be able to visualize plans and ideas
Study for a state license to work
Have a four-year college degree

Gardener

Enjoy active, outdoor work
Like to work with plants
Have knowledge of plant and soil chemistry
Have patience and precision
Train under the direction of a skilled worker
Enjoy seeing things grow

Reclamation Foreman

Be willing to do physical work
Be able to work well with people
Be able to make decisions that others will follow
Train on the job
Be willing to study on one's own

Forest Ecologist

Like to do a variety of outdoor activities
Be curious and imaginative in solving problems
Be able to evaluate data and like mathematics
Like to work with plants and wildlife
Have a four-year college degree

Conservation Technician

Have good health and physical stamina
Desire to travel
Be able to read maps and charts
Enjoy physical, outdoor work
Like to work with plants and wildlife
Have training beyond high school

Meteorologist

Be logical and accurate in evaluating data
Have mathematical ability
Be able to keep neat, accurate records
Be able to interpret maps and charts
Have a four-year college degree
Have training, perhaps, in the military service

What Kind of People Choose Environmental Careers?

Many environmental careers are new to the world of work. The demand for people to fill job openings is increasing. As public interest in the environment grows, more and more people will enter newly created jobs. Job advancement and work adjustment will probably change as new methods of training improve. Future job requirements will probably demand higher levels of education. Environmental careers, like all careers, are changing in many ways. It is possible, however, to make some guesses as to the kinds of people that are needed to handle this change.

- Environmental workers will be people who are **flexible,** able to adapt to new and different situations.
- They will desire to grow and learn as their jobs meet future demands.
- They will be people who like to teach and who can communicate their ideas to the public.
- They will work with people and be sensitive to their needs.
- They will be knowledgeable in the part their jobs have in improving and maintaining a balanced environment.
- They will be people who enjoy solving problems in logical and carefully planned steps.
- They will be people with mechanical, mathematical or scientific ability.
- They will be dependable, because they will know that the public needs and appreciates their work in keeping a healthy and useful environment for the present and the future.

Do these job qualities sound familiar? Are they the qualities of the people you have read about in this booklet? Well, they are the same. The environmental workers of today show the interest and dedication that will be needed in the future. How many of these qualities do you have?

Measure Yourself For an Environmental Career

Do any of the careers in this book interest you?

Do any of the careers seem as if they may fit your needs, interests and abilities?

Did you particularly enjoy many of the suggested activities in the book?

Do your favorite school subjects prepare you for environmental work?

How many of the job qualities on the preceding page fit you?

Do you have an interest in providing a healthier, safer, more useful environment for yourself and others?

If you can answer *yes* to many of these questions, then perhaps you will want to investigate further the advantages and openings available to you in the Environmental Cluster of Careers.

Invite environmental workers to your classroom. Ask them about their work. What things do they enjoy? What are the challenges that excite them? While they are talking and answering questions, carefully observe their reactions. You will probably note a dedication, an interest and an enthusiasm for their work that have made their careers satisfying life experiences.

Resources

Books and Pamphlets

Day, Albert. *Making a Living in Conservation.* Harrisburg, Pa.: Stackpole, 1971.

provides a list of conservation careers, rather than a narrative; contains many references

Dodd, Ed. *Conservation: Careers for the '70s.* New York: Crowell Collier Press, 1971.

much information on professional and nonprofessional conservation jobs; emphasis on hunting and fishing; contains many references

Fanning, Odom. *Opportunities in Environmental Careers.* New York: Universal Publishing and Distributing, 1971.

contains environmental background about history, science, public health, ecology; honest and realistic about openings for women, minorities, handicapped; discusses high school dropouts

Millard, Reed; et.al. *Careers in Environmental Protection.* New York: Julian Messner, 1974.

provides a background on ecology, showing what environmentalists are accomplishing; emphasis on private industry, showing the economic factor of the environment problems; discusses the role of the armed forces

Olympus Research Corporation. *Career Education in the Environment.* Washington, D.C.: U.S. Government Printing Office, 1971.

an excellent resource for all types of environmental careers; some curricular activities included

Perry, Jane, and Perry, John. *Foresters and What They Do.* New York: Franklin Watts, Inc., 1973.

Popeye and Environmental Careers. New York: King Features, 1973.

Also found in most public libraries are:
Dictionary of Occupational Titles (DOT)
Occupational Outlook Handbook

Both sources are available from the Superintendent of Documents, U. S. Government Printing Office, Washington, D.C. 20402.

Government Bulletins about Environmental Careers

Occupational Outlook Reprint Series 1785
from: Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

Bulletin
No.

11 Waste Water Treatment Plant Operators (25¢)
29 Exterminators (25¢)
62 Conservation Occupations (25¢)
64 Environmental Scientists (30¢)
65 Life Science Occupations (25¢)
67 Physical Scientists (30¢)
68 Technician Occupations (30¢)
100 Sanitarians (25¢)
117 Urban Planners (25¢)

Some Associations That May Provide Career Information

American Geological Institute
2201 M Street, N.W.
Washington, D.C. 20037

American Geophysical Union
2100 Pennsylvania Ave., N.W.
Washington, D.C. 20037

American Institute of Planners
917 15th Street, N.W.
Washington, D.C. 20005

American Meteorological Society
45 Beacon Street
Boston, Mass. 02108

American Public Health Association
1015 18th Street, N.W.
Washington, D.C. 20036

American Society of Planning Officials
1313 East 60th Street
Chicago, Illinois 60637

Ecological Society of America
Department of Botany
University of North Carolina
Chapel Hill, N.C. 27514

Environmental Protection Agency
401 M Street, S.W.
Washington, D.C. 20460

Institute of Food Technologists
Suite 2120
221 North LaSalle Street
Chicago, Ill. 60601

International Association of Milk, Food, and Environmental Sanitarians
Blue Ridge Road, P.O. Box 437
Shelbyville, Indiana 46176

National Environmental Health Association
1600 Pennsylvania Street
Denver, Colorado 80203

Water Pollution Control Federation
3900 Wisconsin Ave., N.W.
Washington, D.C. 20016

Your guidance counselor and career orientation coordinator will have other valuable resources for you. Talk to them about your interests. They will help you plan your course of study in ways that best meet your needs.

Vocabulary

advocacy	the act of listening to people's problems and then working to solve them
air quality index	a number that represents the combined amounts of pollutants in the air
analyst	a person who carries out tests on substances to determine what materials are in them
analyze	to determine what is in some substance; for example, to determine the chemicals in blood
bacterial sampling	determining the amounts and kinds of microscopic organisms in a particular substance, as in sewage or treated water
certification	evidence of having shown required skills to perform a set of tasks; evidence of having earned a license to operate
crucible	a small porcelain or metal cup used for carefully measuring or heating some substance
datum (*pl.* data)	a fact or piece of information
ecology	the study of ways plants and animals live together in their environment
ecosystem	the interaction of living and nonliving things in a small or large area
environment	all of the things and forces in a particular area
environmentalist	a person who studies or in some way works with the things and forces in an environment
facility	a structure designed and built to serve some purpose
field worker	a person who works in the community more than in an office or laboratory
flexible	able to adapt or change with new experiences or as new data are learned

forest ecosystem	the interaction of living and nonliving things that are found in a forest, as opposed to those in grasslands, swamps or deserts
laboratory	a place for scientific experiments or tests
lifestyle	the general living habits of a person; the quality or standard of living a person adopts
natural resources	all of the useful things, such as coal, lumber and food, that are found in the environment
operating permit	a license that allows a person or company to do certain things that are listed on the permit
organic chemistry	the study of the substances in living things, substances made by living things, or substances that are like those made by living things
particulate matter	small pieces of matter, such as dust or soot in air and mud in water
pesticide	a chemical substance that kills such pests as flies and mosquitoes
pollutant	something in a part of the environment that does not belong there
pollution	all of the materials in the environment that do not belong there and thus harm the environment in some way
recycle	to put some unusable thing back into a usable form, such as to return waste water back to clean, usable water
responsive	acting in a way that answers the problems and satisfies the needs of people
retardation, mental	slowness in understanding, learning and emotional development
Ringelmann Smoke Chart	a chart, with various grays and black, that is used to measure the amount of air pollution in smoke
rural	relating to the country, country people or country life

sewage	water that contains waste materials from homes, businesses, schools, factories and other places where people live and work
sludge	material that settles to the bottom of a large tank of sewage or at the bottom of any other body of water
suspension	a substance that contains small pieces of matter floating in it; the act of small particles floating in a substance
traditional	according to established ways; planning and doing for long-established reasons
turnover	the replacement with new workers of people who have left jobs; the rate at which workers are replaced
urban	relating to a city, city people or city life
zoning	dividing a community into areas for various uses, such as residential zones and commercial zones

CE 010 408

The Career Orientation Program at Grades 7 and 8 was the initial component of the K-10 Career Development Program and began in Ohio in 1970. In 1972, a *Career Orientation Curriculum Guide* was written and published through the inputs of personnel in the participating school districts. The *Guide* was revised in 1973, again utilizing local personnel. From these guides, 15 USOE occupational clusters are identified as containing information necessary to assist seventh and eight grade students in making tentative career decisions for exploration activities in Grades 9 and 10.

This booklet was developed to provide students information about the career opportunities and occupational information in the cluster of "The Environment."

This booklet can be used to integrate career information with various subject areas at Grades 7 and 8.

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